

What is claimed is:

1. A material defect evaluation apparatus using positron for evaluating the degree of deterioration of a specimen by measuring a positron lifetime after irradiating positron to the specimen, comprising: a positron source, a positron detector and a  $\gamma$ -ray detector, wherein, the positron source and the positron detector are arranged in a container through which a light is not transmitted, and, a positron transmitting window, through which positron emanating from the positron source and transmitting through the positron detector is transmitted outward, is arranged in the container.

2. The material defect evaluation apparatus using positron according to claim 1, wherein the  $\gamma$ -ray detector is arranged outside of the container at a position which is opposed to the positron detector via the positron source.

3. The material defect evaluation apparatus using positron according to claim 1, wherein a positron shield member, which is made of a material having a known positron lifetime that is not equal to a positron lifetime of the specimen, is arranged in the container at a position which is opposed to the positron detector via the positron source.

4. The material defect evaluation apparatus using positron according to claim 1, wherein a metal film is used as the positron transmitting window.

5. The material defect evaluation apparatus using positron according to claim 1, wherein the positron detector is an avalanche photo diode.

6. An evaluation method using the material defect evaluation apparatus set forth in one of claims 1 - 5, comprising the steps of: detecting a pass of positron emanating from the positron source by means of the positron detector; emitting positron through the positron transmitting window to the specimen; detecting a generation of  $\gamma$ -ray due to positron annihilated in the specimen by means of the  $\gamma$ -ray detector; measuring the positron lifetime defined by an interval between the time when the pass of positron is detected by means of the positron detector and the time when the generation of  $\gamma$ -ray is detected by means of the  $\gamma$ -ray detector; and evaluating material defects of the specimen on the basis of the thus measured positron lifetime.